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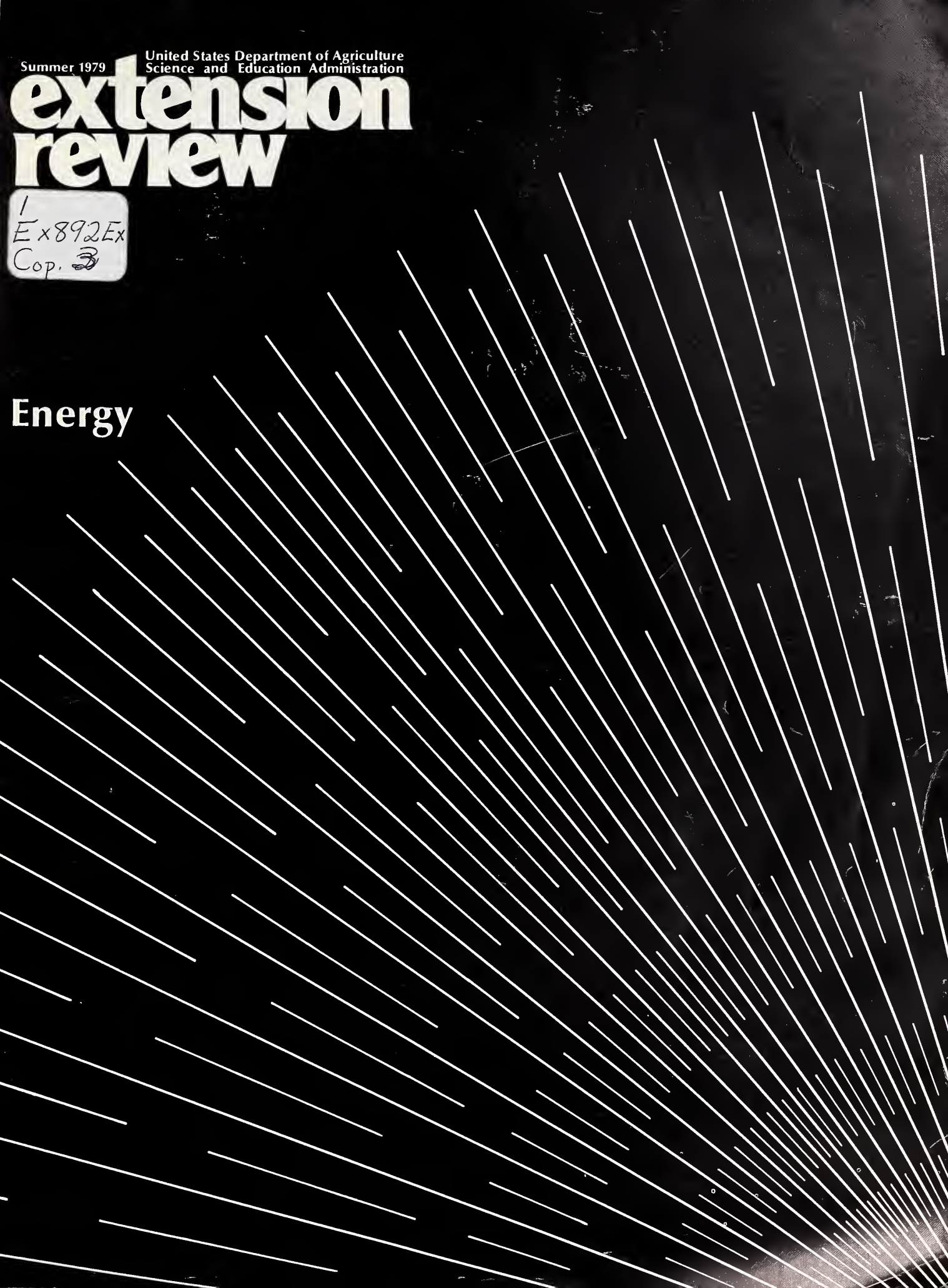
extension review

Energy



Gasohol—A Critical Choice

"Alcohol can be manufactured from corn stalks and from almost any vegetable matter capable of fermentation: growing crops, weeds—even the garbage from our cities. We need never fear the exhaustion of our present fuel supplies so long as we can produce an annual crop of alcohol."

That's what Alexander Graham Bell said before a high school graduating class in Washington, D.C. in 1917. The idea is old and nearly universal. It appeared with the depression when farmers could not sell their products, and reappeared with each succeeding recession and fall in grain prices. The logic made sense: the technology was there; alcohol was easily made by fermenting grain or other plant material, and it could be used for fuel either alone or in combination with ordinary gasoline. The mixture (in a 90 percent gasoline, 10 percent alcohol combination) is gasohol. But gasoline was cheaper than alcohol, and readily available. And Americans adopted gasoline.

Now, Americans don't have enough fuel. In 1977, they drove 113.7 million cars 1.12 trillion miles and burned 80.2 billion gallons of gas—and the number of cars, miles, and gallons is rising every year. And once again, gasohol is a potential solution. The key word is potential.

Alcohol costs more to make than gasoline. Ethanol (alcohol which can be made from grain and other biomass) costs significantly more than gasoline, depending on the price of the grain. It takes energy to make the change from plant matter to alcohol, and then to mix the alcohol with the gasoline. In addition, the production of alcohol to make gasohol for the U.S. would require systems similar to those required to make gasoline—transportation of raw materials and of alcohol, for example; and indirect costs: taxes, profits, interest on debt, and the cost associated with creating, transporting, and marketing a substance that is both flammable and federally controlled. And the costs of the physical plants would be considerable. To produce enough alcohol to make gasohol for the entire country, it would take 10 billion gallons of alcohol—the combined production capacity of 500 facilities, each producing 20 million gallons per year.

But with all of these costs, there are benefits. Distillers' dried grain, a byproduct of the ethanol-producing process, is a fine, high protein animal feed. Ethanol enhances the octane rating of gasoline, and this alleviates the problem of engine knock. Gasohol reduces some carbon monoxide emissions and, according to some scientists, can produce better mileage than straight gasoline. And, with increased technology, some scientists are confident that methods can be developed to produce alcohol using no more energy than is contained in the alcohol.

There are other unresolved areas: large quantities of grain, if diverted from the export market to produce alcohol, could affect the welfare of countries which depend on American agriculture for their food. A well-meaning but ineffective tax incentive system to promote gasohol might benefit shrewd investors more than America's farmers. Finally, if more energy from oil or natural gas were used in producing gasohol than is contained in the gasohol, farmers could end up spending more, not less, in increased costs for fertilizer, feed, or fuel. These are not problems yet. Still, gasohol is a multifaceted issue, with each part inextricably related to the others.

In addition, difficult decisions relating to the directions of future research are needed if technology is to advance. For example: How feasible is the idea of creating alcohol with the aid of solar energy? Could gasohol profitably be made from alcohol which has been made from coal? What about biomass—could energy from this source economically change plant matter into alcohol? Research into gasohol historically has taken many directions. But the prospect of readily usable technology, not past investment in gasohol research, must determine the direction this research will take in the future.

Gasohol could potentially contribute to the solution of America's energy dependence on foreign nations. The challenge of gasohol is to help to create usable fuel where less existed before. In meeting this challenge, American agriculture faces a critical choice; it can proceed in one of two directions.

The first direction is to pay the price entailed in seeking a way to make gasohol work for the American people. This money is like risk capital. The research needed to develop the scientific, technological, and economic expertise which might bring gasohol to fruition requires a serious, expensive commitment on the part of American agriculture and the American people. And there is no guarantee of success.

The second direction American agriculture could take is to do less than the research that would be required to learn just how valuable gasohol could be to America. This second choice involves the risk of missing the opportunity which gasohol could represent. America could save the costs of research, of exploring ways that the system might be made to work. But if the potential does exist, and Americans fail to find it, then not only American agriculture but the entire country will be far more dependent on foreign nations than it would be otherwise.

America can well afford the first risk. It absolutely cannot afford the second.—*Robert Deimel.*

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extension review

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Solar Power On the Farm

by **William S. Sullins**
Assistant Extension Editor
Kansas State University

Using solar energy on the farm was only an idea in the early 1970s. Today it is an idea whose time has come. Solar power is here, helping to produce meat for the dinner table.

Twelve Kansas livestock producers are using solar power to heat swine farrowing houses. By year's end, the number will be at least 16.

"A producer investing in a solar collector-storage system similar to an experimental unit located here (Kansas State University) can recover his investment in 7 years," claims James P. (Pat) Murphy, Extension agricultural engineer in structures and environment. "Many traditional farm structures are built with the hope that the investment is returned in 10 years."

Murphy is the conduit through which research information collected at the experimental facility, built 4 years ago, is transmitted for actual on-farm use. Under a combination Department of Energy (DOE) and USDA-SEA grant, Murphy spends a third of his time working with farmers interested in solar-heated hog facilities.

Once a producer decides to go that route, he may get his plans and instructions from Murphy. And the specialist throws in some practical advice to help get the project off the table.

The plans basically reflect experimental work done at K-State by professor Charles Spillman, Department of Agricultural Engineering. Animal science professor Robert H. Hines and research assistant Victor Robbins aided Spillman in the project.

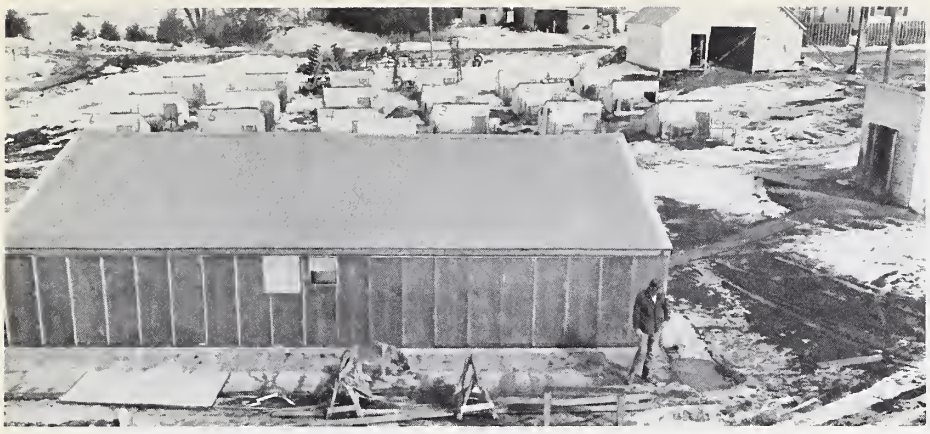
Spillman built the experimental 8- by 50-foot solar collector-storage unit on the south wall of the farrowing house at the university's swine research center. Partial funding was provided by the Economic Resource Development Agency (ERDA).

The idea is to use the solar wall to preheat ventilating air in the hog house. In winter, fresh air entering a livestock building must be heated to the temperature in the confined space. In Kansas, where high winds may combine with cold temperatures to send the wind chill index plummeting to several degrees below zero, energy required to obtain that goal can be excessive. Most producers use LP gas or electricity to heat the space.

Solar energy is ideal in this case, Spillman points out, because a system to preheat the ventilating air can use energy of much lower quality, as heat of any kind in winter reduces the amount of conventional energy used.

Another appealing feature of solar power is that producers don't have to build a new structure to take advantage of the sun—a wall can be added to an existing building, as was the case at K-State.

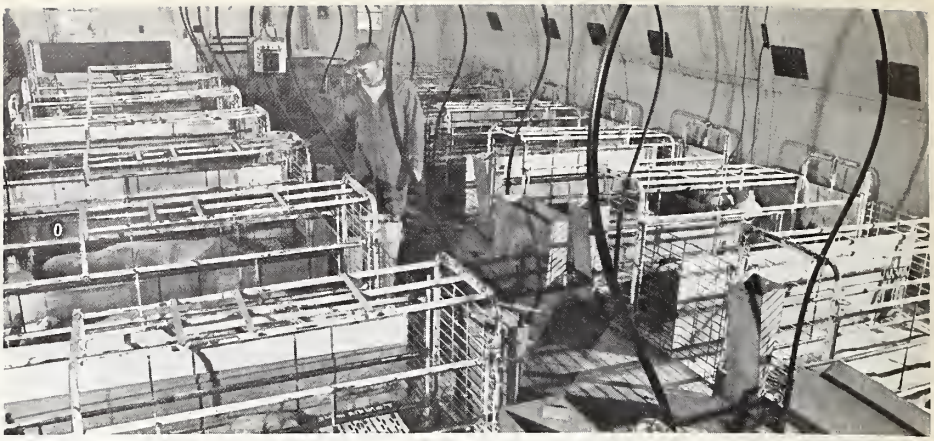
The main features of the solar wall, which provide a net collecting area of 380 square feet, are a stack of solid concrete blocks (6 by 8 by 16 inches) painted black with openings from front to back, and a



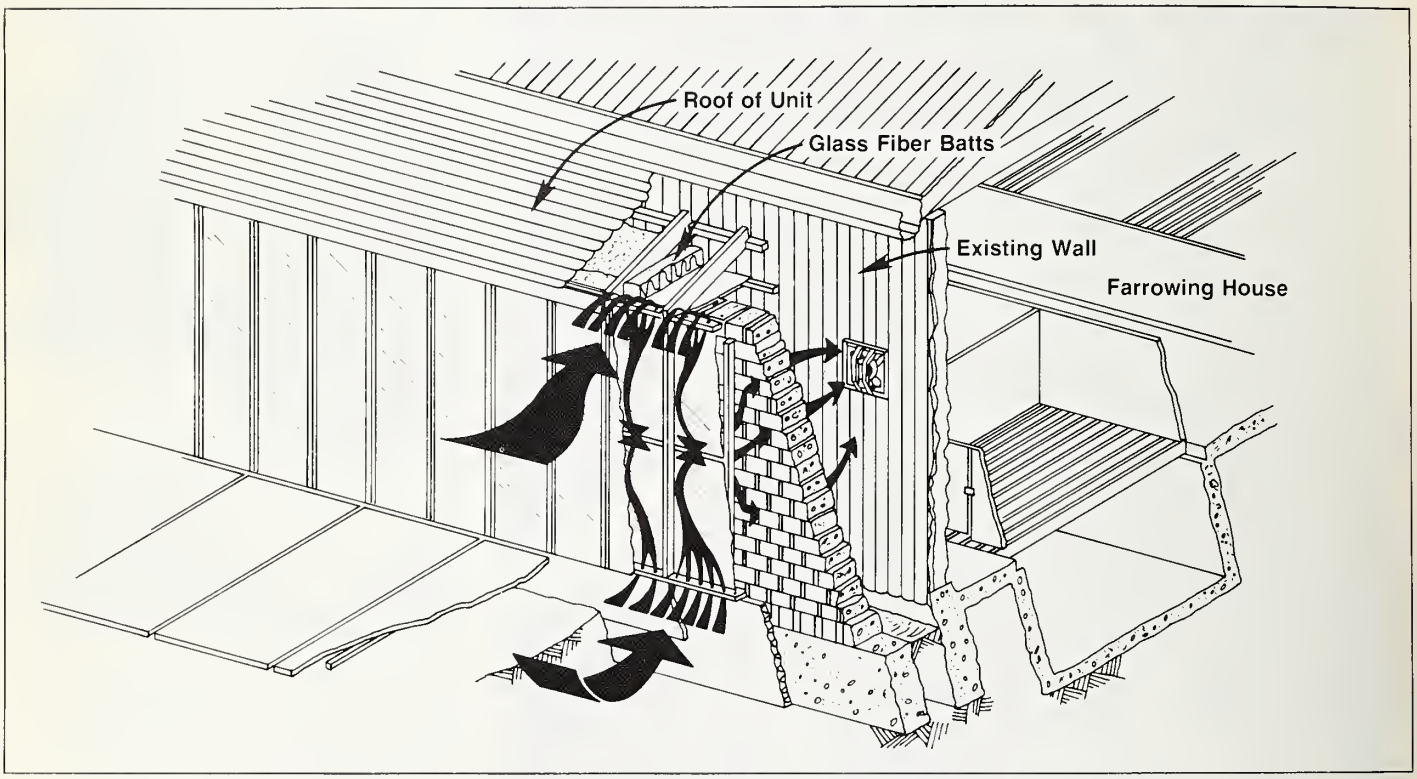
This view of a solar-powered farrowing house shows isolettes in the background—individual quarters for a single brood sow and baby pigs. The isolettes will eventually be phased out, thus saving labor and energy costs (0279W218-4).

Charles Spillman (left) and James P. Murphy discuss possible alternatives for improving the performance of solar units being used by a pork producer (0279W213-26A).

Arlan Benteman is one of 12 Kansas livestock producers using solar power to heat swine farrowing houses. He should recover his initial investment within 7 years (0279W220-22A).



This solar energy collection and storage wall supplies natural heat for Kansas State's farrowing house. Arrows show the path of air as it is heated on its way to the ventilating fan (PN-4189).



double transparent plastic cover on a frame that allows ventilating air to pass between the covers as it enters the system.

Moving the air through the space between the covers allows the air to pick up some of the heat that would otherwise be lost. The air removes heat from the south side of the blocks first and cools the surface to further reduce heat loss from the storage.

Inside, a centrifugal fan connected to a duct system moves the air to the furnace in the farrowing house.

Spillman says the solar energy collected and used January through March one year was equal to burning 335 gallons of propane; from April 1 through June, savings equaled 170 gallons.

With farrowing house temperatures maintained at 60° to 65° F., Spillman estimates the equivalent of 1 gallon of propane is saved for each square foot of collector for Kansas conditions. Savings would vary depending on location.

The scientist believes the basic concept of the solar energy collector-storage system for preheating ventilating air will become a viable economic alternative as energy becomes less available and more expensive.

"We plan to continue research and hopefully refine the system to make it even more efficient," he said.

As for cost, Murphy said his experience with farmers indicates that a solar wall for preheating ventilating air in a farrowing house can be built for $7.50 per square foot of collecting space. About $4 of that amount is labor.

Plans and operating instructions for the collecting system are available for $3 per set from Murphy at Extension Agricultural Engineering, Seaton Hall, Kansas State University, Manhattan, Kan. 66506.□

Dale Keesecker's solar collectors were built from concrete blocks and resin reinforced fiberglass panels. All materials needed to build a solar-powered farrowing house are readily available to producers through building contractors, lumberyards, and solar energy vendors (0279W217-34).

Alan Johnson, assistant research engineer, keeps a watchful eye on monitoring equipment in the nursery on Dale Keesecker's farm in Washington, Kansas (0279W217-25).

Storing the Sun

by **Lenore Paulsen and Bob Logan**
County Extension Agents
Oregon State University

Workshop participants built and permanently installed three solar collectors at the Douglas County Fairgrounds, gaining confidence to do the same on their own homes.

Western Oregon is notorious for cloudy, rain-soaked winters. Because of this, few Douglas County residents gave solar energy a second thought until the Oregon State University (OSU) Extension Service sponsored a 2-day Home Energy Fair.

Douglas County Extension agents Lenore Paulsen and Bob Logan combined practical workshops and seminars with more than 40 exhibit booths. "We wanted to give people a chance to do more than just look, so we created as many opportunities for hands-on experience as we could," said Paulsen.

Solar Workshop

The highlight of the Home Energy Fair was a 12-hour workshop on how to build solar hot water collectors. "The workshop attracted 40 participants," said Logan. "We knew there was some community interest in solar collectors, but what really surprised us was that half of the participants were women."

John Hermannsson, OSU Extension solar energy agent, taught the workshop along with members of the Solar Energy Center from the University of Oregon. Working with more than $1,000 worth of materials donated by local merchants, lumber companies, and the fairgrounds administration, solar workshop participants built 13 hot water collectors and installed three of them on the roof of a fairgrounds building.

"The collectors at the fairgrounds are now a permanent exhibit showing the potential for solar heated hot water. It's an extra and lasting benefit from the workshop," Paulsen said.

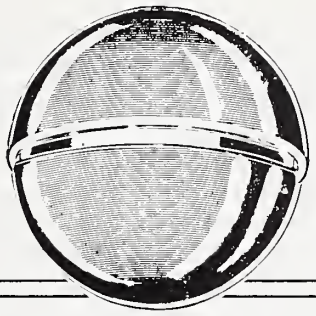
The remaining 10 collectors were raffled to workshop participants. When installed, these solar heating units will significantly cut the cost of heating hot water. From May to September, they can provide all the hot water most families in Douglas County will need. And even in the gloomier winter months, 20 percent of the hot water can be heated with a solar collector.

The solar collector workshop drew people from many miles around. Lori Mead drove 200 miles from Payette, Idaho, to attend. Lori said she wanted to learn how to build the collectors "so we can put on a workshop like this in our community."

Other Subjects

In addition to solar energy opportunities, fairgoers were treated to such energy-saving subjects as wood heat, home insulation, and energy efficient home building and remodeling. More than 3,000 people attended the Home Energy Fair.

In addition to the exhibits, OSU Extension specialists and private



consultants offered 28 hours of public seminars on a wide range of subjects including:

- Learning about solar greenhouses
- Using the sun to heat and cool your home
- Buying a wood stove
- Improving fireplace efficiency
- Looking for houses that almost heat themselves
- Making homes energy efficient
- Saving energy with window treatments
- Cutting your own firewood—does it pay?, and
- Installing and maintaining wood burning stoves.

Appreciation

"I really appreciated being able to listen to an expert on wood stoves and then see all the stoves on display in the exhibit hall. It helped me decide what I wanted to do," said one attendee.

A local 4-H group sponsored a booth featuring high energy foods such as nut mixes and fresh fruits. A forestry class from the local community college designed a walk-through, test-yourself display of different wood species in Douglas County.

Two other displays contrasted the old and the new. Retired senior volunteers manned a display featuring a turn-of-the-century kitchen complete with wood cook stove and kitchen appliances.

"We wanted the public to remember how functional the cook stove was," said Paulsen. "It did everything from cook the family meals to provide a toasty spot for the family dog." In contrast to the pioneer kitchen was a fully constructed solar greenhouse filled with flowers.

Commercial exhibitors paid $30 for each booth. The money was used to defray the costs of educational exhibits, booth assembly, and fees for some guest lecturers.

Future Fairs

Agents Paulsen and Logan are not beginners in designing energy-related fairs. When home heating costs soared in 1977, they put together a Home Heating with Wood Fair that attracted more than 2,000 people. Response to the exhibit and seminar format was so encouraging that the Home Energy Fair of 1978 was patterned after it.

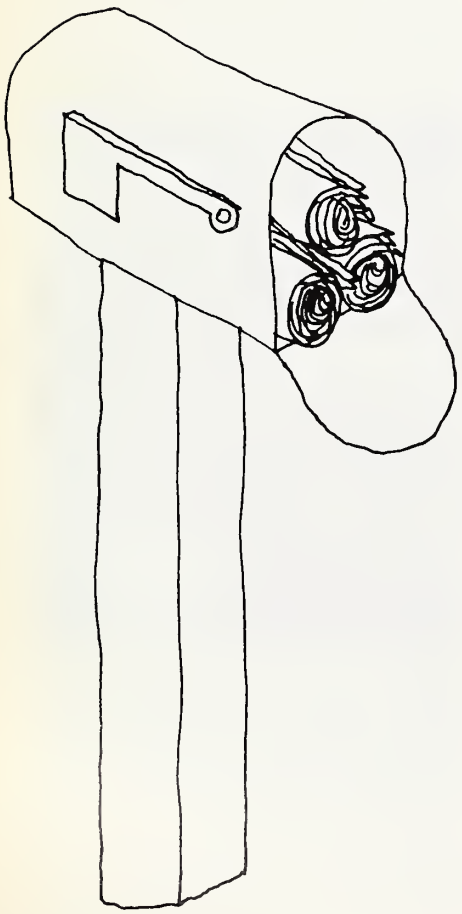
With 2 years of experience, Paulsen and Logan are planning more energy fairs. After seeing the enthusiasm of the participants in the solar collector workshop, the Douglas County fair manager suggested a cooperative venture be worked out where he would make arrangements for exhibits and the OSU Extension Service would handle the educational seminars and workshops.□

Seeing is believing as fairgoers look at a model energy efficient house showing properly installed insulation in the floors, walls, and ceiling.

Retired senior volunteers demonstrated how the oldtime wood-burning stove warmed the house and provided heat for cooking (Photo courtesy Roseburg News-Review).

Be Energy Aware

by Deborah Witham
Publications Editor
University of Kentucky



The University of Kentucky Cooperative Extension Service has taken the state's energy program into each of the more than one million households in the state.

A massive mailing put a Special Energy Edition of the UK Ag Report into the hands of each household. This 24-page tabloid, designed to bring news to every family on how to conserve energy at home, is perhaps the most visible part of the Kentucky Extension energy program, but it is by no means the only part.

Coordinated by Sandra Smith Holland, Extension specialist for energy conservation, Larry Turner, ag engineering energy specialist, and Joe Williams, public information energy awareness coordinator, the efforts have been wide-ranging and comprehensive, and promise to help every Kentuckian "be energy aware."

Extension, working in conjunction with the Kentucky Department of Energy, is responsible for the residential and agricultural production energy sections of the Kentucky energy conservation plan.

Here are the thé highlights of the efforts so far:

Agriculture

—With the help of a computer, farmers can now try different production strategies and then compare them on the basis of energy required, economics, and management.

—Computers are also helping farmers, farm equipment dealers, and others analyze various grain harvesting, handling, drying, and storage alternatives on the basis of economics and energy consumption.

—A pasture renovator has been developed to interseed legumes into grass fields instead of applying nitrogen fertilizer to the fields. Renovation reduces fossil energy input and increases beef production per acre as compared with nitrogen fertilization.

—Wheat, corn, and soybean residues are being test-burned to produce a gas which could be used directly for grain drying on the farm or other purposes.

—A scaled prototype solar bulk curing facility for tobacco is being designed, constructed, and evaluated. This system would permit use of the mechanical leaf harvester already on the market, yet would utilize solar energy to reduce fossil fuel requirements.

Publications

Other areas of effort include using solar collectors to store heat for grain drying, using alternate energy sources for swine housing systems, and conserving energy in greenhouse heating.

These efforts and others are the basis of publications available through Extension to farmers as part of the Energy in Agriculture series. This "on the farm" information is supplemented by an "at home" Energy in the Home series, and a series of home Energy Fact Sheets that are part of the residential portion of the program.

Residential

—CHEAP (Computerized Home Energy Analysis Program), a key part of the energy conservation program, is designed to give a homeowner knowledge about the economic feasibility of adding insulation, and making other home energy conserving adjustments.

County agents have been trained to assist homeowners in both filling out the input form and interpreting the computer print-out.

The CHEAP service is free to all Kentuckians and is starting its second year of use. Program evaluations indicate that 53 percent of those responding to this survey had no prior contact with the Cooperative Extension Service. That's a lot of people reached, since 100,000 copies of the brochure are in print, in addition to the forms in the energy tabloid.

Energy Efforts

In addition to the CHEAP input form, the tabloid includes a self-energy unit, and many articles on insulation, solar energy, heating systems, window coverings, carpeting, appliance operation, and other energy conservation techniques as they apply to the home.

Area and regional training sessions were held to help the staff develop as energy resource persons. More than 350 Extension agents attended energy workshops given by the University of Kentucky Cooperative Extension Service. An energy contact agent for each county coordinates the county energy education efforts.

Each county has been provided with a resource packet of energy materials. Additionally, the counties have available teaching boards on weather stripping, caulking and insulation, and a slide-set on home insulation. These supplement the Energy in the Home series of fact sheets and publications.

An outreach program that provides people with information on ways to decrease energy costs and conserve existing energy resources has been successful because it does not interrupt daily routines. PACE (Plan and Conserve Energy) Breaks are six 15-minute mini-sessions on energy conservation presented during lunch or work breaks at factories, schools, downtown business districts, homemaker club meetings, or anywhere there is a group of people.

Mall displays are also successful in reaching large numbers of people. A recent exhibit attracted nearly 10,000 people. And a "Be Energy Aware" display is available for county and state meetings.

Since television is such a popular medium, these efforts are supported by television spots on residential energy conservation.

4-H Youth

Finally, an important part of the total residential program is the 4-H youth program, because future adult energy awareness must start with children today.

The project attempts to give youth a basic awareness of energy sources, use, and conservation. Project books are available from the fourth grade through the high school levels, and 60,000 are currently in use.

Also, the 4-H members are involved in other energy-related projects such as experiments, posters, energy fairs, or running the CHEAP analysis in their homes.

Results

The ongoing effort of providing county agents with knowledge, tools, and techniques to help them reach the people with energy conservation information is beginning to show results. Approximately 30 per cent of the users of CHEAP have added home insulation as a result of this program. And so far, approximately $15,000 has been saved by those who participated in the CHEAP program and made their homes more energy efficient.

But as much as immediate results, Kentucky Extension is seeking to instill in its clientele—all the farmers and homeowners of the state—a responsible attitude toward use of the nation's energy resources.

This they intend to pursue energetically.□

Connecticut— A Conservation Challenge

by Alexander (Bud) Gavitt, Jr.
Agricultural News Editor
University of Connecticut

Connecticut's 11 energy associates are making great progress in providing information on energy conservation in a pioneering program being conducted by the University of Connecticut's Cooperative Extension Service (CES).

Between November 1, 1977 and March 31, 1979, approximately 20,000 Connecticut residents received information and assistance in personal contacts through programs, workshops, exhibits at county and town fairs, and other activities. Thousands of other state residents received information on energy savings through newspapers and radio and television programs.

More importantly, a mail survey of the 20,000 clients, contacted directly by the energy associates, indicates that about 71 percent have taken positive actions or are seriously considering energy conservation measures.

Federal Grant

According to Doris A. Lane, CES assistant director for home economics and energy, Connecticut is one of only 10 states in the country taking part in federally funded pilot Energy Extension Service programs.

An initial grant of $308,000 was awarded to CES from the Energy Division of the State Office of Policy and Management (OPM) to fund the program for 17 months, from November 1, 1977 to March 31, 1979. An additional $138,000 appropriation extends the program through September 30, 1979.

CES has conducted one phase of the state's Energy Extension Service program, which provides information and educational assistance to individuals and families about a variety of energy conservation concerns.

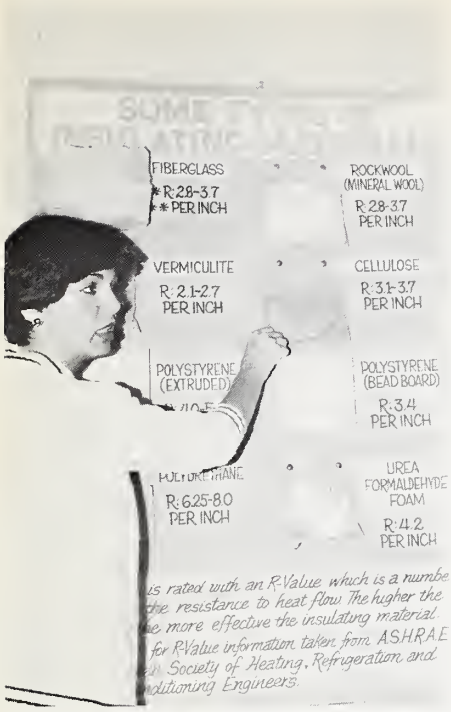
The State's Departments of Economic Development and Administration Services are also involved in the Energy Extension Service program. They have provided information and assistance to small businesses, municipalities, churches, and museums.

Lane says that CES conducts its informational program through a staff of 11 energy associates at 10 field offices around the state. The associates provide information on window treatments and home furnishings to conserve energy, wood stoves, caulking and weather stripping, insulation techniques and materials, selection and use of home appliances, alternative energy sources such as solar heating systems, and landscaping to saving energy.

Examples

Following are some examples of successful programs conducted by the energy associates:

- In Fairfield County, Energy Associate Lynn Dobieski sparked the presentation of a Youth For A Brighter Tomorrow (YFABT) energy conservation program to 1,700 Boy Scouts at 13 meetings. A reward patch was given to the Scouts based on different levels of their accomplishments. The YFABT program has also been given to 6,000 pupils in grade schools throughout the county. Currently, the YFABT project is being conducted jointly by energy associates and 4-H agents for 4-H members across the state.
- CES conducted projects in New Haven and Hartford to encourage landlords and tenants to conserve energy. In New Haven, CES Community Home Economist Luberta Sims and Energy Associate Bruce Wilbur presented programs to these groups. Officials of the Home Maintenance Corporation, Regional Rehabilitation Institute,



Lorraine Scotto, energy associate for Middlesex County in Connecticut, points to cellulose as one of several types of effective insulating materials for the home.

and the Low Income Planning Agency cooperated with them. Selected community participants volunteered to make energy improvements in their homes. A part-time architect provided technical assistance to the participants.

• In Hartford, Urban Energy Associate John Ruckes worked with CES Home Economist Rhea Lawton in two neighborhoods. This project was carried out through the cooperation of the South Arsenal Neighborhood Development. Energy information was provided to maintenance personnel and management in an 11-building apartment complex. Volunteers were trained to extend the information to tenants. Energy information services also have been provided to residents of 1,200 dwellings in the Blue Hills neighborhood.

Billboards

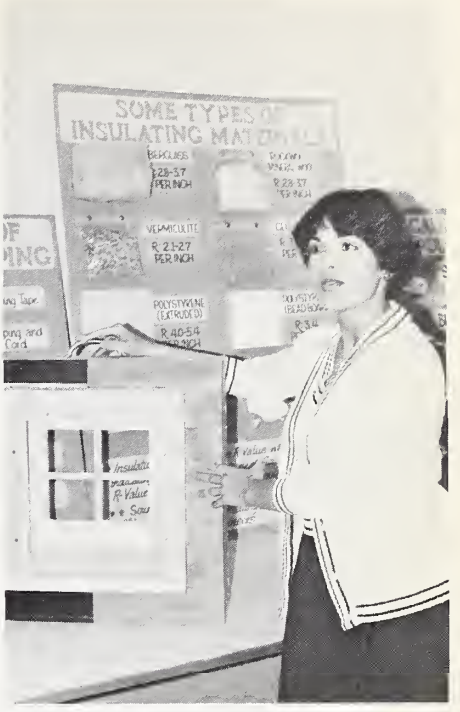
• Last summer and fall, OPM posted 100 billboards throughout the state carrying a blue and white poster of a snow-covered house with the message: "Brrr . . . Winterize Now." At the bottom a hotline telephone number was listed where people could call the local energy associate for further information.

• The energy associates, in cooperation with officials of the state's Energy Division, built a 24-by 6-foot display showing where measures could be adopted to save energy in a kitchen, bathroom, living room, and basement. More than 58,000 viewed the exhibit at the 1979 Hartford Home Show and about half of them signed up for advertised publications.

• CES has distributed a 16-page reprint giving energy information tips to both landlords and tenants. This was first printed in "Street Talk," a magazine published by the Regional Rehabilitation Institute with a circulation of 50,000.

• The energy associates publish a quarterly newsletter titled "Energy Update," with a distribution of 20,000 copies to state residents. It contains articles on current events, seasonal energy uses, and new developments such as solar energy, and tax credits for making energy conservation improvements.

There is a different back page for each of Connecticut's eight counties pertaining to local programs and services, including the name and telephone number of the energy associate(s). This is the biggest press run of any Extension newsletter in Connecticut. Catherine MacDuff, energy associate for Tolland County, serves as editor.



Lorraine Scotto shows where to caulk around the window to save energy at home. Behind her are shown other types of insulating materials used when insulating your home.

• On the agricultural level, CES regional horticulturists, in cooperation with Byron Lyon, CES energy engineer, have conducted five workshops for greenhouse operators. Discussions were held to explain to growers what energy-saving methods could be used, what they would cost, and what savings might occur. Estimates reveal a potential saving of almost 5 million gallons of fuel oil per year for greenhouse operators and managers who install energy saving practices in their businesses.

In commenting on the work of the Energy Extension Service, Connecticut's Governor Ella Grasso said, "This wide-ranging program will help the citizens of Connecticut reduce their dependence on costly fuel oil and will help them meet the energy challenges that face all of us."□

Turning On People Power

by James W. Gooch
Director, Program Information
University of Wisconsin-Extension

It's called turning on "people power." Using what staffers feel is a unique approach, Extension's Environmental Resources Unit (ERU) is creating an educational model involving young people and their families.

ERU was awarded a grant from the Wisconsin Energy Extension Service (WEES) to advance energy programming and curriculum for youth and family Extension programs within the North Central Region.

A 10-person Wisconsin energy education design committee, including state and county youth faculty and energy specialists, outlined a framework for developing state energy programs and staff training workshops.

During a spring workshop, Extension faculty from Wisconsin, Michigan, Iowa, Nebraska, and Minnesota swapped ideas and materials used successfully in their states to tell young people about energy conservation. Observers from Kansas, Illinois, and Indiana also took part.

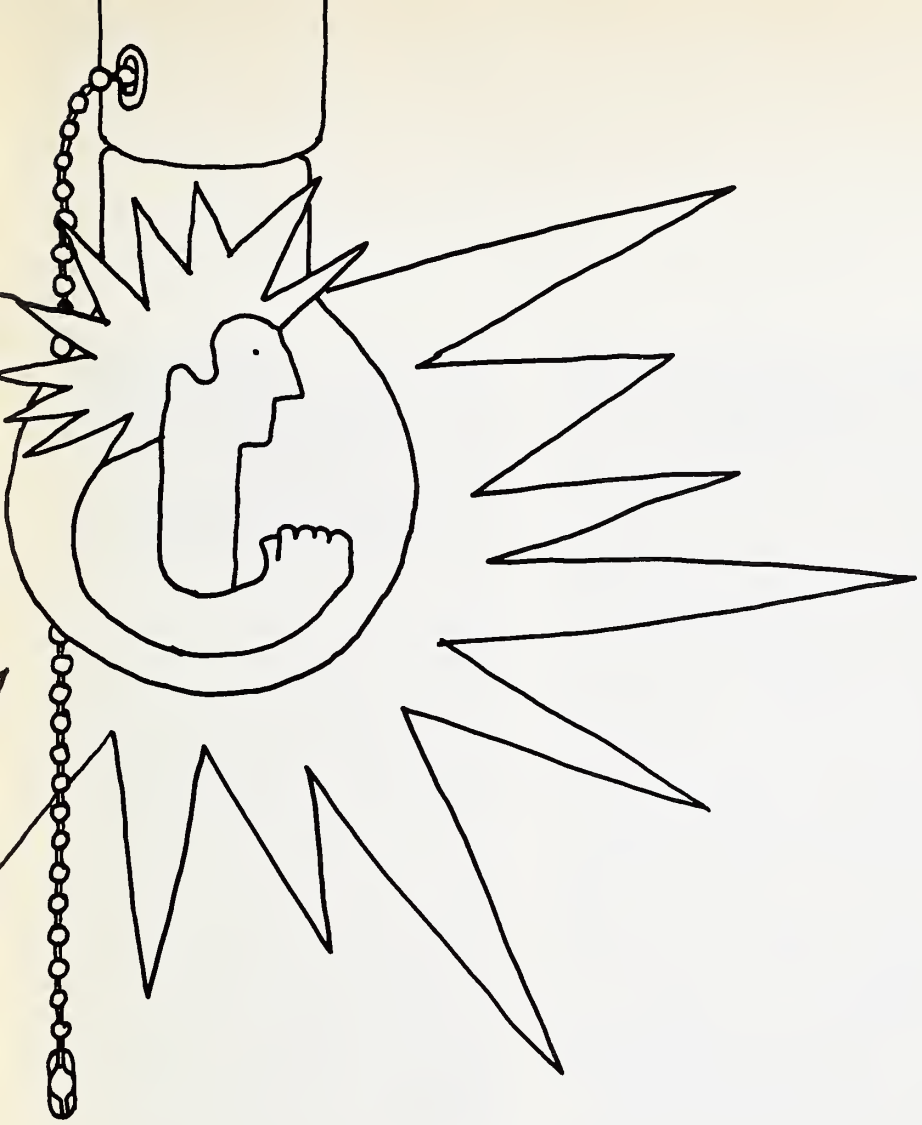
Energy Workshop

Workshop participants chose the home energy investigations model for use in a 6-month pilot project. Home energy investigations are designed to help 9- to 12-year-olds and their families explore ways that they now use energy and methods for better management.

Each investigation relies on the home, and family members are resources for learning. Housing, clothing, food, transportation, and leisure are major areas of family energy use and can be opportunities for learning about conservation.

A few examples of home energy investigations and related areas are: stoking the human furnace (buying groceries and preparing meals); housewarming party (putting up storm windows or insulated drapes); horsepower or footpower (travelling to work or school); and kill a watt (choosing and using appliances).

"Parents and leaders play an essential role in helping youth learn," explains Susan Thomas, ERU program coordinator. "Learning about



energy with youngsters provides a natural opportunity for adults and youth to learn together about one another and the world they share.

"And people power is a source of energy we must tap if we are to find creative and practical ways of meeting the worldwide energy crisis," notes Thomas.

The 4-H Design Committee is developing additional materials and in September the combined energy education package will be introduced to youth and family eduction leaders in Manitowoc, Marinette and Milwaukee Counties.

Other Projects

Almost 60 other University of Wisconsin Extension energy projects are underway which relate to Wisconsin agriculture. Most are grouped under the following categories: general energy use; field operations; transportation; irrigation; livestock; dairy; poultry; crop drying; fertilizers/pesticides; processing; green house operation and housing.

A few examples are:

- Transporting agricultural produce accounts for 41 percent of Wisconsin's trucking. Agricultural produce haulers in seven southwestern counties are targeted to show that petroleum consumption can be cut by 10 percent annually.

To do so, an Energy Conservation in Agricultural Transportation & Food Distribution Project, in conjunction with the Energy Extension Service, offers personal counseling to farmers, transportation firms, small processors, feed mills and grain exchanges. More than 1,500 farmers and 110 firms are being contacted and demand for these services soon will expand statewide.

Average savings per vehicle is $1,250 per year. This is done by redesigning routes, eliminating empty back-hauls or partial loads, centralizing loading and storage locations, and improving equipment maintenance.

- The Department of Agricultural Engineering is preparing a "white paper" on gasohol production from ag products. "We're reviewing all existing literature, from an energy and dollar standpoint and putting

gasohol in perspective so people can say 'this is what we know about it.' Then, after this is completed, people can take it (gasohol) from there," explains department chairman Fred Buelow.

- On the grain front, agronomists and ag engineers have constructed a solar crop drying demonstration unit. This "compromise" unit—a mix of batch or flow drying plus solar energy—shows farmers the labor-saving advantages of shelled corn and reduces usage of purchased energy.

This type of drying involves a system where sunheated air is circulated through shelled corn by an electrically powered fan. The only purchased energy required is for operating the fan—much less energy than is needed for high-speed drying.

Helping Business

David Lulling is the owner and manager of a 210-seat restaurant in Madison. Lulling went to a UW-Extension energy conservation workshop for restaurants during January, 1978 to "get some handle on (my) energy bills."

Just that month, for example, Lulling's utility bills cost $1,350. Using what he learned at the workshop, Lulling cut his bill to $1,150 in February. And that $200 savings was just the beginning.

For March, his bill dropped below $1,000 "for the first time ever," Lulling says. And for April—still a chilly month—he paid only $938.

How did he do it? Simply by using no-cost and low-cost measures learned at the workshop. He recaulked all windows and doors, and shut off grills, fans, and other equipment whenever they weren't in use.

Lulling set back his thermostat. He switched from 150- and 200-watt lights to 30-watt "baby spotlights." He staggered the morning turn-on time for major appliances to avoid stiff demand charges from the utility company.

Having started his energy management program, Lulling requested on-site consulting from the Wisconsin Energy Extension Service (WEES). The consultant, an engineer from a Madison firm, wrote a detailed report identifying additional actions and investments required to reduce his energy usage further.

Lulling now has a report in hand constituting a blueprint for his energy strategy over the next few years. It will save him a lot of energy and money.

Conservation

This 'success story' is not atypical of hospitality industry owners/operators who have attended energy conservation workshops conducted by the UW-Extension Recreation Resources Center.

More than 650 hospitality businesses have been aided, with conservation measures resulting in a 10 to 20 percent energy use reduction. Many have reported a savings of $1,500 annually.

More than 600 households in Milwaukee's central city have received "do-it-yourself" training and some weatherization materials. The homeowners report an average fuel savings of $80 per year.

Special training was provided for 135 home auditors with the various utilities, and, to date, these auditors have inspected over 15,000 homes and followed with fuel saving recommendations.

Public buildings in eight Wisconsin communities have been remodeled to help local governments cut energy waste. Equipped with monitoring devices, these buildings are open to the public and are serving as energy conservation demonstration centers.

Messages on safety and efficiency in wood heating have been given to 1,455 persons attending workshops and to 98,700 who requested publications. Individuals using wood report savings ranging from $200 to well over $300 per year.

As a result of media interest and efforts of the UWEX Information office and county faculty, more than 1 million Wisconsin citizens are now regularly getting energy conservation messages through newspapers, radio and TV stations. The EES Information staff and state specialists also are assisting county Extension offices which function as the local energy information centers throughout the state.□

Energy Education

by **Tony Burkholder**
Information Coordinator/4-H
Michigan State University

Tomorrow's effective energy conservation lies in the hands of our youth. A special project being conducted by Michigan State University Cooperative Extension Service 4-H youth programs is geared toward enhancing that future.

The Youth Energy Project, begun last year, is aimed at 50,000 high school students in hopes of increasing their understanding of the current energy situation and their awareness of energy conservation methods. The program is also intended to reduce energy consumption by at least 5 percent in half these students' families.

Lowell Rothert, 4-H program leader, says that so far more than 33,000 high school youths have increased their energy awareness in the first phase of the effort. The program is being conducted by the MSU 4-H Youth Programs, and the MSU Science and Mathematics Teaching Center.

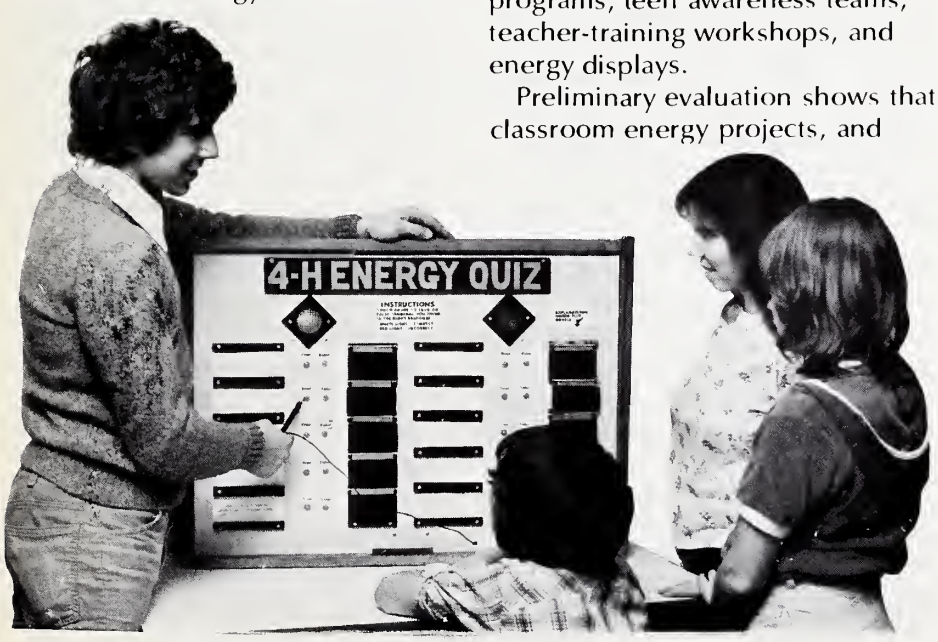
Target Areas

Four target areas were chosen for the pilot project. The first area includes Ingham, Jackson and Calhoun counties. The second consists of Muskegon, Oceana, and Kent counties. The third region is Marquette, Baraga, and Houghton counties; and the final area is Kalkaska, Grand Traverse, Antrim, Charlevoix, Crawford, and Roscommon counties.

The schools in these areas were divided into control and program groups. Regional coordinators used a multi-method approach in their energy education programs.

Several techniques were tested to determine which ones brought about the greatest positive changes in conservation attitudes and behaviors in the youths. Among these were energy assembly and theatre programs, teen awareness teams, teacher-training workshops, and energy displays.

Preliminary evaluation shows that classroom energy projects, and student participation in conserving energy in their homes are the most effective educational tools. Supportive materials include slide-tapes, brochures, an energy bike, a photovoltaic display that converts sunlight directly into electricity, a solar hot water exhibit, and an engine powered by fumes from burning charcoal.



Education

An evaluation of the program conducted by the Michigan Commerce Department Energy Administration's (MCDEA) Energy Extension Service indicated that conservation in public schools can make significant positive changes on energy attitudes of students and their families, according to Dr. William Stevens, MCDEA study coordinator.

Further analysis indicates that energy dollars saved by the students are greater than the cost of providing the instruction, Stevens says.

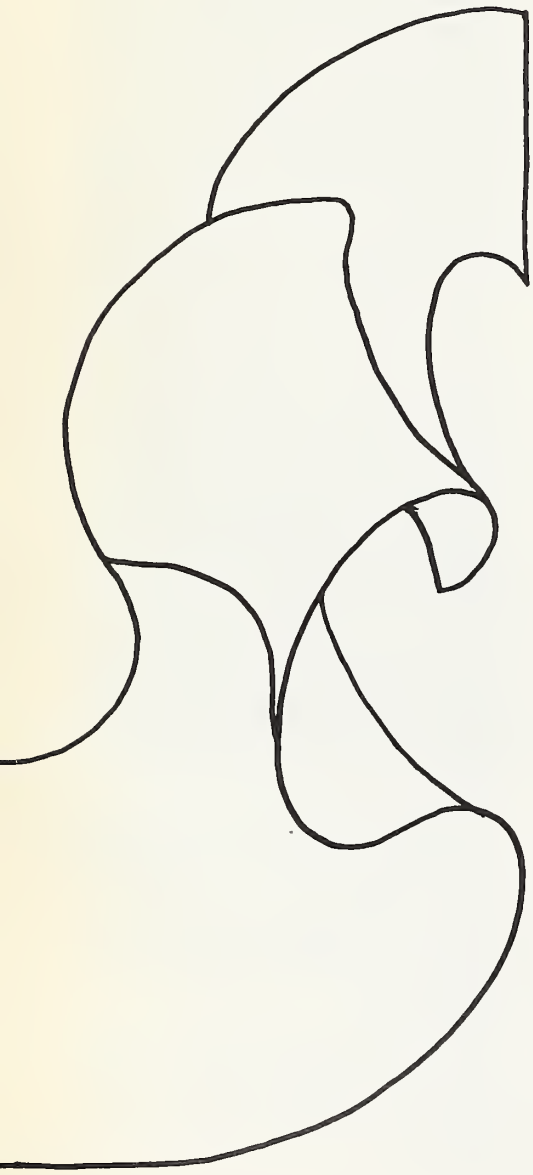
The Youth Energy Project is currently in its second phase. "We're emphasizing those classroom methods that worked best during the first phase," Rothert said. "We'll also test some new teacher workshops, consultations with teachers, and a committee approach aimed at making the effort even more effective."

Along with further evaluation of curriculum materials, there will also be a measurement of the actual change in the energy consumption behavior of Michigan high school students involved in the project, Rothert says.

The Youth Energy Project is funded by the U.S. Department of Energy (DOE). It is administered by the MCDEA's Energy Extension Service.□

Greenhouse Growers Save With Plastic

by Pat Williams
Assistant Energy Editor
Ohio State University-Extension



Acres and acres of plastic may be the best answer to spiralling fuel costs and problems of energy supply for Ohio greenhouses.

Growers who wrap their greenhouses with two air-inflated sheets of polyethylene can expect a 57-percent fuel savings, say researchers at the Ohio Agricultural Development and Research Center at Wooster.

For most people, turning out a neatly wrapped birthday present is a frustrating ordeal. Imagine then, trying to enclose a greenhouse 42 feet wide with plastic sheets—and out-of-doors.

But David Anderson, a greenhouse owner from Piqua, decided to give it a try.

"What really got me going," recalls Anderson, "was hearing Hugh Poole, Extension horticulturist, at a Cooperative Extension short course. He talked about double layers of plastic and what you can save with doing it—or go out of business."

Industry Threat

Poole was not joshing about the threat to Ohio's greenhouse industry—a precarious business at best. Although Ohio ranks first in the country for production of greenhouse tomatoes (1976) and fifth in florist products, escalating heating costs have forced some greenhouses to close and others to question whether they could stay in business.

Growers were warned of a gas shortage 5 years ago when supplies were cut back. Anderson moved fast to deal with the crisis by replacing gas-fired heaters with boilers, which could be switched either to gas or oil. He started storing oil in underground tanks.

"Two years ago," Anderson said, "they told us they were going to shut us down, and they actually turned off the heat in a big portion of the house. We had to cut prices and sold as many plants as we could. That really scared the socks off us."

Polyethylene

The next summer, Anderson began covering his glass greenhouses with two layers of polyethylene. A 4-inch fan blows air between the layers, keeping the plastic from rippling. It feels soft to a gentle push—like pressing a tired beach ball.

In addition, he converted his whole heating system to a fan jet. And in the summer of 1978 he squirreled away another 20,000 gallons of oil. At last, he told himself, his greenhouses were ready for whatever blows the weather and the fuel companies could administer.

So last winter there he was—his houses enveloped with plastic, 38,000 gallons of oil on hand and three new boilers—confronting the coldest winter in Ohio's history. So what happened?

He used only two-thirds of his gas allotment and not one drop of oil. He was able to run the greenhouses at 75 degrees, compared with the 45- to 55-degree temperatures that had been hard to maintain in other winters.

He found that the warmer houses

were more humid, so he didn't have to water as much as before. Although the plastic cut the sunlight by 18 to 20 percent, he could not see any reduction in plant quality.

"The mums were the best we've ever had," Anderson said.

Anderson is one of many Ohio growers who have chosen plastic as one of the most effective ways to reduce energy losses. He still keeps in touch with the Extension staff at Wooster and often demonstrates his energy-saving ways to visiting growers.

Bead Insulation

The greenhouse research and Extension team at Wooster doesn't have its needle stuck on plastic, however. In publications and workshops, they are also recommending improved cultural methods, better use of space, good boiler maintenance, a plastic seal process to stop air leakage, and thermal blankets.

And for the future, they are perfecting a system of pumping polystyrene beads—the kind that fill bean bag chairs—between the plastic layers. This system can slash winter losses by a whopping 90 percent.

The beads work in a fairly simple way. At night, two pressure blowers shift the beads from a storage bin through ductwork into the plastic cover, and supply replacement air to keep the plastic layers inflated.

In the morning the process is reversed, as the system sucks them out like a vacuum cleaner. In an experimental greenhouse 20 feet wide and 40 feet long, the process takes only 10 minutes to fill and 20 minutes to empty.

And the plastic-bead-plastic sandwich has other applications than saving energy. Flowers such as chrysanthemums and poinsettias that need short days to bloom may be quickly curtained from the light.

Feasibility

Scientists headed by Ted H. Short, agricultural engineer, have been running an experimental greenhouse using the beads for 3 years. But is such a system feasible for a large commercial greenhouse?

Wayne Roston from Ontario is convinced of its value. After hearing about the beads, Roston developed and installed his own transport system on two gutter-connected, plastic-covered flower houses. He is now developing a greenhouse designed specifically for the bead insulation.

"We've worked back and forth with Roston," said Short. "We have learned some things from him, and he has learned some things from us."

The Greenhouse Energy Conservation project is one of three Ohio Department of Energy-supported programs at Wooster.

Corn Drying

Another is conserving energy in corn drying—a process requiring 20 to 30 percent of the total energy of corn production.

Research shows that Ohio farmers can save as much as one-third of the energy required for drying, by choosing high-yielding corn hybrids matched to expected weather conditions in their area.

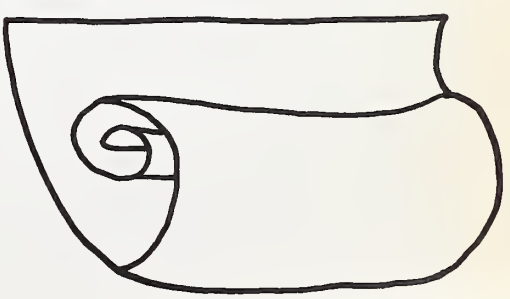
Money is one reason for growing drier corn. Fuel savings is another. Donald J. Eckert, Extension professor in agronomy, teaches that harvesting drier corn does not mean losses in yields. Bill Schnug and Ted Glenn, Extension and research agricultural engineers, show how to dry this "already dry corn" down to safe storage levels more efficiently. This approach to growing and drying corn is cutting cost and saving fuel.

Underway

In another project, studies are underway to explore alternative energy heating of dairy process water.

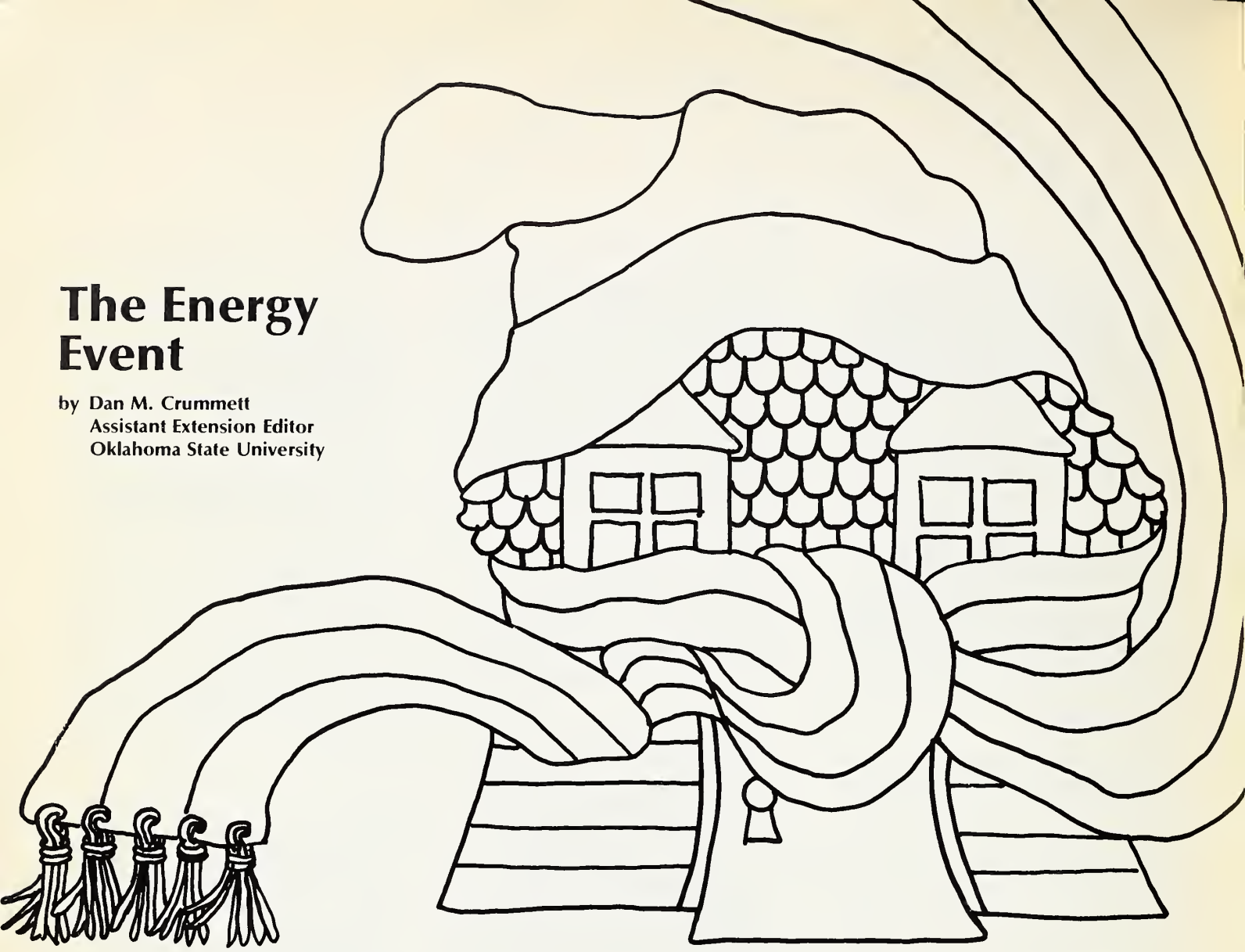
Now cranking up is a demonstration to show whether the sun can provide an economical heat source for livestock structures.

Ten producer-cooperators have been chosen from many farmers anxious to try solar heating. They include six swine, two dairy and two poultry operators. The USDA/Department of Energy (DOE)/funded project will try out a variety of solar units and types of buildings to discover whether using solar energy is technically possible and worth the cost.□



The Energy Event

by Dan M. Crummett
Assistant Extension Editor
Oklahoma State University



Cutting back 5 percent in energy consumption may not seem very impressive at first, but when that 5 percent represents the equivalent of enough diesel fuel to fill the tanks of 730,000 average tractor-trailer rigs, it takes on a new significance.

That 5 percent figure—the amount of energy estimated to be saved on rural Oklahoma homes and farms by 1980 because of the Energy Event—represents the equivalent of 146 million gallons of diesel, says Ken Jones, extension agricultural engineer at Oklahoma State University (OSU).

The Energy Event, an educational program involving agriculture, home economics, and information specialists from OSU has approached 75 percent of its goal according to Jones and Sue Williams, Extension home economist.

A Unified Program

Fueled by various grants from the Oklahoma Department of Energy and sparked by the lack of a unified program in energy education, Jones and Williams set out, with OSU's Agricultural Information Services Department, to create a coordinated, three-pronged program supported by the expertise of Extension specialists.

"We realized we needed a unified program for Cooperative Extension, otherwise we would continue paralleling effort and wasting resources," Williams said. "The people in the counties wanted something uniform, so we decided a common logo for all energy-related factsheets and brochures was needed," she added.

Now, all energy information produced by OSU Cooperative Extension bears the massive "E" and the "Energy Event" title.

Brochures

Under the title comes a number of factsheets on Home, Agricultural, and Family uses of energy.

Those brochures dealing with the technical aspects of energy conservation in the home detail heating and cooling requirements across Oklahoma, the relative merits of different types of insulation, and ways to prevent air infiltration.

Also, various ways of saving energy in cooking methods, appliance selection, and behavioral aspects,

such as personal energy-use habits and routines, are covered in the free material. In addition, energy use on the farm is stressed in material dealing with tillage and irrigation.

When the Energy Event was introduced to the public in the spring of 1978, one brochure included a home energy evaluation scale which allowed homeowners to check the energy efficiency of their own home, Jones said. "In this way they could see where they were losing heating and cooling dollars and could contact us for further information on how to make their dwellings more energy efficient."

Those colorful pamphlets were originally distributed solely by Extension, but Jones said tremendous help came from energy cooperatives, construction firms, contractors and others involved in energy-related businesses.

Media Messages

The Agricultural Information staff produced three slide-tape sets to visually take the conservation message to Oklahomans. "Reducing Home Heating and Cooling Costs," "Family Energy Management," and a youth-oriented production, "Conservation and You," were distributed to the state's five extension districts for support of county Energy Event programs.

The National 4-H Council selected the youth tape for use nationwide in energy education settings, Jones said. "We plan to make two more visuals concerning tillage and irrigation practices," he added. After county Extension agents became familiar with the energy event program, the public was informed of the program through newspapers and radio and television coverage.

"News releases were distributed to all daily and weekly newspapers in the state announcing the energy program and giving Oklahomans energy-saving tips," Jones said. "The response has been excellent!"

Also, he said, the state's 125 radio stations received similar information on pre-recorded tapes while public service announcements were prepared in 10- and 30-second lengths for all state television outlets.

That's when the time-consuming, long days of travel and taping began for Jones and Williams.

In that first year, the pair taped a total of 19 television talk shows, ranging from 3 minutes to 30 minutes, for use on Oklahoma's commercial and educational television channels. Estimating their audience through television station statistics, the specialists say more than 400,000 homes were reached through the talk shows, including 32,000 farm homes.

Goal Surpassed

Using those figures, newspaper ciruclation statistics, and a method of accountability approved by the state Energy Department, OSU Cooperative Extension has estimated the energy savings effected from the Energy Event will surpass the original goal of 5 percent savings by 1980—and all for a price tag of about $150,000, not including the input from Extension.

To arrive at the savings figure representing the 146 million gallons of diesel fuel, Jones says one must remember all forms of energy—gasoline, nuclear, and natural gas produced electricity, wood heat, etc.—have been combined in the comparison. Some fuels, such as gasoline, have a much higher energy content than others, such as wood. The estimates are based on British thermal units, or therms, and the savings has been stated in the equivalent amount of diesel fuel in therms.

"E's" Future

What about the future of the Energy Event? Jones and Williams say renewed funding of the program this year calls for similar but continued work, plus the addition of a computer program to allow Oklahomans to plug in their homes' energy saving equipment, the type of fuel they use, and family habits, to arrive at an audit of where their energy dollars are going. Someday the program will allow participants to use the OSU computer to determine what they can spend to save energy, where their dollars will be most effective, and how long it will take for energy-saving equipment to pay for itself on their home in typical weather.

Both Jones and Williams agree the program has been successful because of the cooperation between disciplines within the university, and the fact people are vitally interested in energy and its economics. The quality of the material produced, however, is high on their list of credits. "In a program like this, where everyone is publishing material on energy, we felt if it was high quality and attractive, then people would respond," Jones explained.

And, people are responding.□

Master Conservers Care

by Steve Denner
Energy Extension Agent
Washington State University

"Demystifying" home energy conservation is what the Washington Energy Extension Service is all about. In cooperation with the Washington State Cooperative Extension Service, the Energy Extension Service is providing residents in the Seattle area with information about home weatherization, recycling, and alternative fuels like wood and solar.

One particularly successful energy conservation program, according to Steven Denner, Energy Extension agent, is the Master Conserver course. Modeled after two other Cooperative Extension Service courses, the Master Gardener and the Master Canner, this course is offered free in exchange for a 30-hour commitment by graduates to teach their neighbors the energy-saving techniques they have learned, says Denner.

Course Topics

During the intensive 8-week course, Master Conservers learn how to insulate their homes, build storm doors, weatherstrip and caulk around windows and doors, and the efficient operation and maintenance of home heating systems.

Other topics covered include lighting, solar systems, hot water heating, wood stove installation and safety, how to finance weatherization plans, and consumer protection.

Two classes have already been held in the Seattle area since last May, and another is scheduled for March. Over 100 people have graduated and are currently active Master Conservers. They have volunteered 1,500 hours to help other people conserve energy in their homes, too.

The course is taught on eight consecutive Saturdays, with a maximum of 60 people per class, at a local community college. Altogether, participants receive 40 hours of training. Instructors are from nearby universities and utility companies.

Energy Specialists

According to Denner, getting a group of people together with a range of technical and practical experience has been an important part of the program. "We enroll housewives, retired people, engineers, and students— and they graduate as energy specialists." The course is equally valuable for people who own their own home, rent, or want to know about how to buy an energy-efficient home.

"The program gives people a chance to put their concern about energy conservation to work. This is not a band-aid volunteer program. Volunteers can be satisfied that the personal service they provide will have an impact on the total amount of energy people use," says Denner.

"Our follow-ups show that residents have taken a considerable number of energy-saving actions on the recommendation of Master Conservers," adds Denner. The most common are caulking, weatherstripping, installing attic insulation, and hot water conservation.

The Master Conserver program is sponsored by the Washington Energy Extension Service, Washington State University, the Washington State Energy Office and the U.S. Department of Energy.□

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